IN THE CLAIMS:

1. (Original) An apparatus comprising:

a means for providing a collimated beam of electromagnetic energy with a predetermined orientation with respect to a line of sight thereof, and

a means for rotating said beam such that a transverse mode selection therefor is the same for two orthogonal directions thereof.

2. (Original) The invention of Claim 1 wherein said first means includes a slab laser having principal axes.

3. (Original) The invention of Claim 2 wherein said second means includes a porro prism or a Benson prism.

4. (Original) The invention of Claim 3 wherein said prism is rotated 45 degrees about the line of sight with respect to the slab axes.

5. (Original) The invention of Claim 4 wherein the beam is rotated through two successive round trip passes through said slab.

6. (Original) The invention of Claim 5 further including a telescope.

7. (Original) The invention of Claim 6 wherein said telescope is an anamorphic telescope.

8. (Original) The invention of Claim 7 wherein said telescope is disposed between said slab and said prism.

9. (Original) A laser resonator apparatus for generating a laser beam having beam quality along two transverse axes that is determined largely by the mode discrimination characteristics of one axis, comprising:

a slab lasing medium having a first and a second end for emitting a laser beam;

an aperture stop with a narrow transverse dimension and an orthogonal wide transverse dimension for defining a beam profile of said laser beam;

a first reflector aligned to reflect said laser beam emitted from said first end of said slab back therein, thereby defining a first end of a resonant cavity;

an anamorphic telescope having a first end aligned to receive said laser beam emitted from said second end of said slab, said telescope operable to reshape said laser beam profile to be substantially symmetrical about its transverse axes and to emit said reshaped laser beam from a second end of said telescope;

a second reflector aligned receive said reshaped laser beam, and operable to reflect said laser beam back into said second end of said telescope, thereby defining a second end of said resonant cavity; and

a beam rotator disposed between said anamorphic telescope and said second reflector operable to rotate the beam profile of said reshaped laser beam by 90 degrees after two passes.

10. (Original) The apparatus of Claim 9 wherein said first reflector is a porro prism, a Benson prism, a mirror, or a resonant reflector.

11. (Original) The apparatus of Claim 9 wherein said second reflector is a porro prism having its roof-line rotated approximately 45° with respect to said narrow and wide transverse dimensions of said laser beam, thereby serving a dual function as said beam rotator.

12. (Original) The apparatus of Claim 9 wherein said second reflector is a Benson prism having its roof-line rotated approximately 45° with respect to said narrow and wide transverse dimensions of said laser beam, thereby serving a dual function as said beam rotator.

13. (Original) The apparatus of Claim 9 wherein said aperture stop is defined by the transverse dimensions of said slab.

14. (Original) The apparatus of Claim 9 wherein said aperture stop is a mechanical aperture stop positioned along the path of said laser beam.

15. (Original) The apparatus of Claim 9 wherein said aperture stop is positioned substantially closer to said first reflector than to said second reflector.

16. (Original) The apparatus of Claim 9 wherein said telescope is positioned substantially closer to said second reflector than to said aperture stop.

17. (Original) The apparatus of Claim 11 further comprising a half-wave plate positioned between said slab and said second reflector.

18. (Original) The apparatus of Claim 9 further comprising an optical switch disposed within said resonator, said optical switch driven to enable pulsed operation through Q-switching, longitudinal mode locking, or cavity dumping.

19. (Original) The apparatus of Claim 18 wherein said optical switch is a voltage driven nonlinear electro-optical switch operated as a Pockels cell.

20. (Original) The apparatus of Claim 9 wherein said slab is a solid-state lasing medium.

21. (Original) The apparatus of Claim 20 wherein said solid-state medium is ytterbium ion doped yttrium-aluminum-garnet.

22. (Original) The apparatus of Claim 9 further comprising an out-coupler.

23. (Original) The apparatus of Claim 22 wherein said out-coupler is a polarization out-coupler or polarizer.

24. (Original) A laser resonator apparatus for generating a laser beam having beam quality along two transverse axes that is determined by the mode discrimination characteristics of one axis, comprising:

a high aspect ratio solid-state slab lasing medium having a first and a second end for emitting a laser beam, and having a narrow transverse dimension and an orthogonal wide transverse dimension for defining a beam profile of said laser beam;

a first reflector aligned to reflect said laser beam emitted from said first end of said slab back therein, thereby defining a first end of a resonant cavity;

an anamorphic telescope having a first end aligned to receive said laser beam emitted from said second end of said slab, said telescope operable to reshape said laser beam profile to be substantially symmetrical about its transverse axes and to emit said reshaped laser beam from a second end of said telescope;

a porro prism, having its roof-line rotated approximately 45° with respect to said narrow and wide transverse dimensions of said laser beam, and aligned to receive said reshaped laser beam, rotate the beam profile of said reshaped laser beam by 90°, and to reflect said laser beam back into said second end of said telescope, thereby defining a second end of said resonant cavity;

a half-wave plate positioned between said slab and said second reflector and aligned to compensate the polarization rotation caused by said porro prism;

a polarization out-coupler aligned along the path of said laser beam; and

an electro-optic switch positioned along the path of said laser beam and operable to rotate the polarization of said laser beam by 90° upon activation thereof, thereby causing said out-coupler to out-couple a portion of said laser beam from the laser resonator apparatus.

25. (Original) A method for orienting a beam of electromagnetic energy with respect to a line of sight thereof, comprising the step of:

providing a collimated beam of electromagnetic energy, and

rotating said beam such that a transverse mode selection therefor is the same for two orthogonal directions thereof.

26. (Original) The method of Claim 25 wherein said providing step is accomplished with a slab laser having principal axes.

27. (Original) The method of Claim 26 wherein said rotating step is accomplished with a porro prism or a Benson prism.

28. (Original) The method of Claim 27 wherein said prism is rotated 45 degrees about the line of sight with respect to the slab axes.

29. (Original) The method of Claim 28 wherein said rotating step is accomplished in two successive round trip passes through said slab.

30. (Original) The method of Claim 29 further including the step of passing said beam through a telescope.

31. (Original) The method of Claim 30 wherein said telescope is an anamorphic telescope.

32. (Original) The method of Claim 31 further comprising the step of disposing said telescope between said slab and said prism.

33. (Original) A method of generating a laser beam having beam quality along two transverse axes that is largely determined by the mode discrimination characteristics of one axis, in a laser resonator having a slab lasing medium, an aperture stop, a first reflector aligned with a first end of the slab, an anamorphic telescope aligned with a second end of the slab, a second reflector aligned with the telescope opposite of the slab and a beam rotator disposed between the anamorphic telescope and second reflector, the method comprising the steps of:

stimulating emission of a laser beam from the ends of the slab;

limiting the profile of the laser beam by a narrow transverse dimension and an orthogonal wide transverse dimension of the aperture stop;

reflecting, by the first reflector, the laser beam emitted from the first end of the slab back therein, thereby defining a first end of a resonant cavity;

reshaping the laser beam profile, by the telescope, to be substantially symmetrical about its transverse axes;

rotating the beam profile of the reshaped laser beam by approximately 90°, by the said beam rotator; and

reflecting the reshaped laser beam back into the telescope, by the second reflector, thereby defining a second end of said resonant cavity.

34. (Original) The method of Claim 33 wherein the second reflector is a roof prism having its roof-line rotated approximately 45° with respect to the narrow and wide transverse dimensions of the laser beam, thereby serving a dual function as said beam rotator.

35. (Original) The method of Claim 33 wherein the second reflector is a porro prism having its roof-line rotated approximately 45° with respect to the narrow and wide

transverse dimensions of the laser beam, thereby serving a dual function as said beam rotator.

36. (Original) The method of Claim 33 wherein the second reflector is a Benson prism having its roof-line rotated approximately 45° with respect to the narrow and wide transverse dimensions of the laser beam, thereby serving a dual function as said beam rotator.

37. (Original) The method of Claim 33 wherein the aperture stop is defined by the transverse dimensions of the slab.

38. (Original) The method of Claim 33 wherein the aperture stop is a mechanical aperture stop positioned along the path of the laser beam.

39. (Original) The method of Claim 33 further comprising the step of positioning the aperture stop substantially closer to the first reflector than to the second reflector.

40. (Original) The method of Claim 33 further comprising the step of positioning the telescope substantially closer to the second reflector than to the aperture stop.

41. (Original) The method of Claim 35 further comprising the step of compensating the polarization rotation caused by said porro prism at a position between the anamorphic telescope and the second reflector.

42. (Original) The method of Claim 33 further comprising the steps of Q-switching, longitudinal mode locking, or cavity dumping by means of an optical switch to produce a pulsed output beam.

43. (Original) The method of claim 42 wherein said optical switch is a voltage driven nonlinear electro-optical switch operated as a Pockels cell.

44. (Original) The method of Claim 33 wherein said slab is a solid-state lasing medium.

45. (Original) The method of Claim 33 further comprising the step of out-coupling a portion of laser beam from the laser resonator.

46. (Original) The method of Claim 45 wherein said out-coupling step is accomplished with a polarization out-coupler or polarizer.